MYCOTAXON

Volume 112, pp. 339–355 *April–June 2010*

Fungi from palms in Argentina. 1

Mariana Capdet* & Andrea Irene Romero

**marianacapdet@gmail.com*

PHHIDEB-CONICET, Depto. Biodiversidad y Biología Experimental
Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires
Av. Int. Güiraldes 2620, Buenos Aires C1428EHA, Argentina.

Abstract — Thirteen ascomycetes are reported from Argentina from fallen woody parts of three palms in two national parks. *Berkleasmium corticola*, *B. sinense*, *Brachysporiella gayana*, *Dictyosporium cocophylum*, *D. zeylanicum*, *Endocalyx melanoxanthus* var. *melanoxanthus*, *Ernakulamia cochinensis*, *Musicillium theobromae*, *Sporidesmium macrurum,* and *Stachylidium bicolor* are new records for Argentina. *Melanochaeta hemipsila* is reported for the first time as a teleomorph in this country.

Key words — fungal taxonomy, neotropical mycobiota, pyrenomycetes

Introduction

There are nearly 2800 species of palms in the world (Blomberry & Rodd 1982), most of which are used for food, edible oils, timber, and ornamental plants (Hyde & Cannon 1999). In Argentina, there are eleven native palms, ten of which are distributed in the northeast of the country (Cabral & Castro 2007). Many Argentine palm species are found in the Atlantic Forest, a region with great biodiversity but covering only 7–8% of the national surface (Galindo-Leal & Gusmão Câmara 2003). Several areas have been proposed as natural reserves for protection of *Euterpe edulis* Mart. ("palmito"), a palm species that is currently a candidate for vulnerable status (Ministry of Ecology of the Province of Misiones).

Little is known about fungi on palms in Argentina. Spegazzini (1881) was the first to describe some of them, such as *Ceratostoma australe* [≡ *Cannonia australis*], a very common ascomycete on woody spathes of *Butia yatay* (Mart.) Becc., from a cultivated palm tree in Buenos Aires province. Carmona et al. (1990) described a foliar spot caused by *Pestalotiopsis palmarum* (Cooke) Steyaert on *Syagrus romanzoffiana* (Cham.) Glassman (native to Argentina). There is also published work on a foliar spot caused by *Phytophthora palmivora* (E.J. Butler) E.J. Butler, a pathogenic chromistan fungal analogue, on leaves

of *Chamaedorea elegans* Mart., a palm introduced from Mexico to Argentina (Cúndom et al. 2006).

Hyde and co-workers, who have studied fungi associated with palms from various countries, have reported and described many members of *Ascomycota* from palms (Hyde & Fröhlich 1997; Hyde et al. 1998, 2000; Fröhlich & Hyde 2000; Taylor & Hyde 2003).

In order to understand better the diversity of ascomycetes on woody parts of palms in Argentina, we studied ascomycetes on three Argentine palms — *Butia yatay*, *Euterpe edulis*, and *Syagrus romanzoffiana. Butia yatay* is an endangered species (Chebez 1994) and *E. edulis* is a candidate for vulnerable status (Ministry of Ecology of the Province of Misiones).

The present paper reports thirteen species from that study.

Materials and methods

The sampling area comprised two national parks: Iguazú in Misiones Province and El Palmar in Entre Ríos Province (Fig. 1).

The Iguazú national park covers an area of 67,620 hectares (25°41' S, 54°18' W) (APN 2008). This park is included in the "Paranaense province" (Cabrera & Willink 1980) of the Argentine phytogeographical regions. The climate is subtropical without a dry season. Annual rainfall averages vary between 1600 mm and 2000 mm and the annual average temperature is 20°C. The vegetation is subtropical forest, which represents the greatest animal and plant biodiversity in the country (Dirección de Bosques de Argentina 2003). The two palms studied in this area were *Syagrus romanzoffiana* and *Euterpe edulis.*

The El Palmar national park, which covers an area of 8500 hectares (31°55'S, 58°14' W), was established in 1965 with the aim of preserving *Butia yatay*, an endangered species (Chebez 1994). It is included in the Argentine phytogeographical region called "Espinal province" (Cabrera & Willink 1980). The climate is warm and humid in the north, and temperate and dry in the west and south. Rainfall ranges from 400 mm to 1500 mm, occurring mainly in spring and summer (Dirección de Bosques de Argentina 2003). The vegetation includes a savanna with palms, shrubs and gallery forest along the Uruguay river and grasslands. The palm studied here was *Butia yatay*, the only palm present in the park.

Four samplings (one per season) were carried out at each location during 2008, with a total of 825 samples gathered. Fallen rotten, woody parts, i.e. sheaths, petioles, spathes, foliar and floral rachides, were collected. The material was air-dried. Microscopic characters were observed from sporulation in vivo using light microscopy. Sizes of all the structures were based on 20 measurements. Drawings were made with a camera lucida. Photographs were taken with a Sony Digital camera. The specimens are deposited in the BAFC fungal reference collection (Holmgren et al. 1990).

The adopted classification system follows Kirk et al. (2008). For species already recorded from Argentina, brief information and references are given; new records

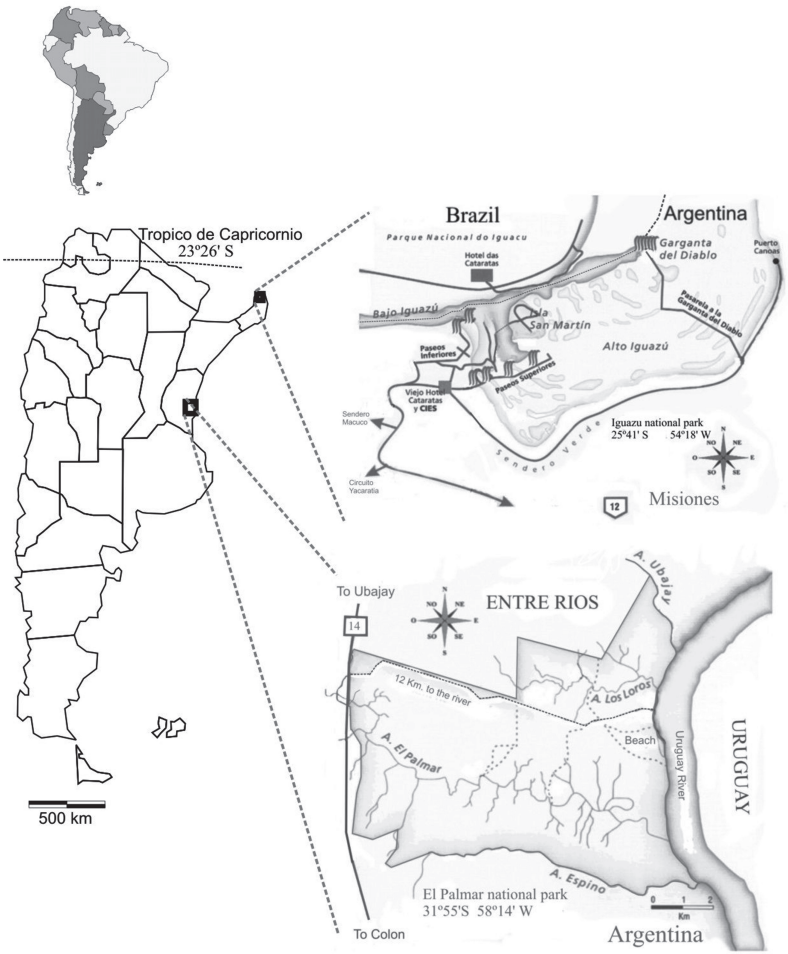


Figure 1 Sampling sites.

for Argentina are fully described and illustrated with information about anamorph-teleomorph relations. The type of substratum (petiole, spathe, floral rachis, etc) is given for each species.

Results

Thirteen taxa were identified, of which ten are new records for Argentina.

Cannonia australis (Speg.) Joanne E. Taylor & K.D. Hyde, Mycol. Res. 103: 1398 (1999). Pl. 1 Fig. 1–3

Description & Illustrations: Taylor & Hyde (1999).

Anamorph — Unknown.

Substratum — Spathe of *Syagrus romanzoffiana*. Peduncle and spathe of *Butia yatay*.

Material examined — **ARGENTINA**. **Entre Ríos, Dpto Colón**: El Palmar National Park. Col. Capdet, M. & Romero, A.I. 23.IV.2008 (BAFC 51673). **Misiones, Dpto Iguazú**: Iguazú National Park. Col. Capdet, M. & Romero, A.I. 22.IV.2008 (BAFC 51674).

Geographic distribution — Argentina; Australia (Taylor & Hyde 1999).

Remarks — The collected material coincides with Taylor & Hyde's description. This species was first described in Argentina by Spegazzini (1881) as *Ceratostoma australe* on *Butia yatay*. Subsequently, Taylor & Hyde (1999) reassigned the species to the new genus *Cannonia* and described material from Argentina (on *B. yatay* from Buenos Aires) and Australia (on *Trachycarpus fortunei* H. Wendl.). This species is frequently found, mainly in the spathe and the floral rachis of *B. yatay,* at any time of year. It also occurs on spathes of *Syagrus romanzoffiana,* but in more limited areas than on *B. yatay* spathes.

Cosmospora vilior (Starbäck) Rossman & Samuels, Stud. Mycol. 42: 126 (1999). Pl. 1 Fig. 4–5

Synonyms: see Rossman et al. (1999).

Description & illustrations: Samuels et al. (1990); Rossman et al. (1999).

Anamorph — *Acremonium berkeleyanum* (P. Karst.) W. Gams (Rossman et al. 1999).

Substratum — Floral rachis of *Butia yatay* and on *Cannonia australis*.

Material examined — **ARGENTINA**. **Entre Ríos, Dpto Colón**: El Palmar National Park. Col.: Capdet, M. & Romero, A.I. 23.IV.2008 (BAFC 51675).

Geographic distribution — Argentina (Catania & Romero 2007), Brazil, Indonesia, New Zealand (Samuels et al. 1990), China (Nong & Zhuang 2005), Taiwan (Guu et al. 2007).

Remarks — *Cosmospora vilior* is among the most common species in tropical and subtropical areas. It has been found on stromata of various members of the *Xylariaceae* in Taiwan (Guu et al. 2007). Recently, Catania & Romero (2007) reported this species on fallen twigs of *Podocarpus parlatorei* Pilg. (from the Yungas region, northwest Argentina) and on stromata of the *Diatrypaceae* family. In the current collection, the fungus grows on necks of *Cannonia australis* and on the floral rachis. The fungus has not been previously recorded in Entre Ríos province.

Melanochaeta hemipsila (Berk. & Broome) E. Müll., Harr & Sulmont, Revue Mycol., Paris 33: 377 (1969, "1968"). Pl. 1 Fig. 6–14

Synonyms: see Müller et al. (1969).

Teleomorph — Ascomata perithecioid, scattered, superficial, globose or pyriform, black, covered with hairs, 0.2–0.4 mm long, 0.3–0.4 mm wide. Asci cylindrical or narrow clavate, unitunicate, eight-spored, pedicellate, with a small refractive non-amyloid apical ring. Ascospores biseriate, fusiform with rounded ends, curved or straight, 5-septate, central cells greenish brown, end cells hyaline, 47–62 × 9–13 μm.

Anamorph — ***Sporoschisma saccardoi*** E.W. Mason & S. Hughes, Mycol. Pap. 31: 20 (1949).

Colonies velutinous, superficial, black, with mixed tufts of capitate hyphae and conidiophores. Conidiophores smooth, straight, hairy, tubular, up to 4-septate, up to 260 μm long, 10–18 μm wide, dark brown in the base, pale brown near the apex. Conidia formed enteroblastically inside the tubular collarette of the conidiogenous cells, cylindrical with ends flat, 5-septate, central cell brown, end cells much paler, 48–68 × 12–16 μm.

Substratum — Spathe of *Euterpe edulis*.

Material examined — **ARGENTINA**. **Misiones, Dpto Iguazú**: Iguazú National Park. Col. Capdet, M. & Romero, A.I. 09.VII.2008 (BAFC 51676).

Geographic distribution — Teleomorph: Australia, France, Sri Lanka, Thailand (Sivichai et al. 2000). Anamorph: Italy, Togo, USA (Hughes 1952); Canada, Indonesia, Italy (Nag Raj & Kendrick 1975); Taiwan (Matsushima 1980); Argentina (Arambarri & Cabello 1990); Australia, Brunei Darussalam, China, Malaysia, South Africa (Goh et al. 1997); Ecuador (Sivichai et al. 2000); Cuba, Perú (Heredia Abarca et al. 2004); France, Puerto Rico (Cybertruffle's Robigalia 2009).

Remarks — The description of *M. hemipsila* coincides with those of Sivichai et al. (2000) and Hyde et al. (2000), but the ascospores are much larger in the Argentine material (47–62 × 9–13 vs 30–40 × 7.5–10 μm). Asci were not measured in the present material because they were not fully formed. The description of *S. saccardoi* given above agrees with the descriptions of Hughes (1949), Nag Raj & Kendrick (1975), Arambarri & Cabello (1990), Sivichai et al. (2000) and Hyde et al. (2000) except for the size of the conidia (27.5–47.5 × 11.5–15 μm vs 48–68 × 12–16 μm), but measurements of conidia in the Argentine material are very close to those given by Heredia Abarca et al. (2004) (52–68 × 12–15 μm).

Sporoschisma nigroseptatum D. Rao & P.Rag. Rao and *S. saccardoi* are very similar species, differing mainly in conidial size. It would be interesting to revise these two species because, if they do not exhibit significant differences, it may be appropriate to synonymize them. Arambarri & Cabello (1990) recorded

S. saccardoi from Buenos Aires province, but the species has not been previously recorded from Misiones.

Considering all the differences in the anamorph and teleomorph, a new species of *Melanochaeta* could be proposed. However, this is not established here since the material was inadequate to serve as a type.

Brachysporiella gayana Bat., Bol. Secr. Agric., Pernambuco 19(1–2): 109 (1952). Pl. 2 Fig. 15–20

Teleomorph — *Ascotaiwania*, fide Kirk et al. (2008)

Anamorph — Colonies hairy, dark brown or black. Mycelium immersed in the substratum, septate, smooth, brown. Conidiophores macronematous, mononematous, erect, dark brown, up to 225 µm long, 3–15 µm wide. Conidia obovoid to obclavate, truncate at the base, smooth, 24–41 µm long, 14–21 µm thick in the broadest part, 3–6 µm wide at the base, 3-septate, brown or olive green, basal cells progressively paler.

Substratum — Spathe of *Euterpe edulis*.

Material examined — **ARGENTINA**. **Misiones, Dpto Iguazú**: Iguazú National Park. Col. Capdet, M. & Romero, A.I. 09.VII.2008 (BAFC 51677).

Geographic distribution — Brazil, Ghana, Sierra Leone (Ellis 1959); USA (Ellis 1971); Japan (Matsushima 1975); Taiwan (Matsushima 1980); Cuba (Mercado Sierra 1981, Holubová-Jechová & Mercado Sierra 1984); Australia (Taylor & Hyde 2003); Costa Rica, Malawi, Malaysia, Puerto Rico, Venezuela (Cybertruffle's Robigalia 2009).

Remarks — This material was identified using the key provided by Ellis (1971). The above description matches those of Holubová-Jechová & Mercado Sierra (1984) and Ellis (1971) except for small differences in conidial sizes.

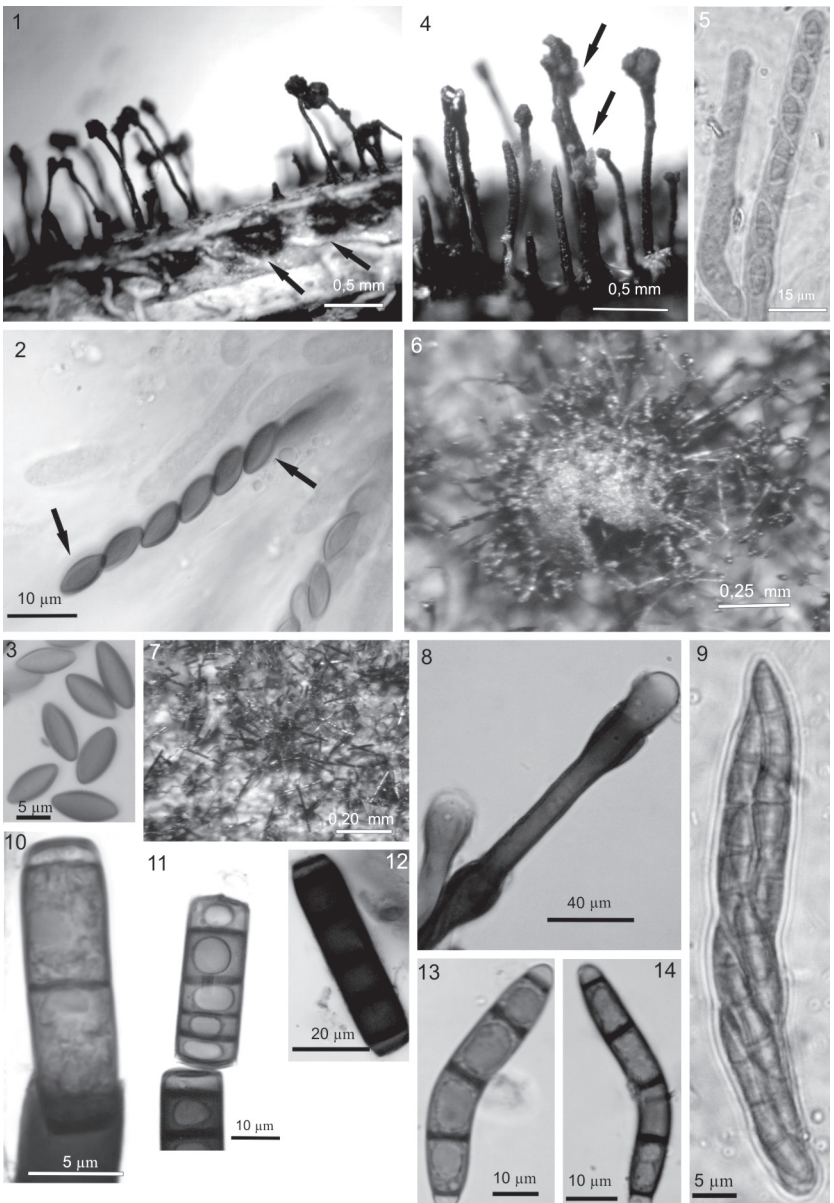
Berkleasmium corticola (P. Karst.) R.T. Moore, Mycologia 51(5): 735 (1961, "1959"). Pl. 2 Fig. 21–24

Teleomorph — Unknown.

Anamorph — Colonies composed of sporodochia, punctiform, black, shining, scattered and discrete. Mycelium immersed in the substratum, composed of pale brown, branched hyphae. Conidiophores simple, semimacronematous, easily broken in two or three parts. Conidia solitary, oval to ellipsoidal,

Plate 1 Figs. 1–3. *Cannonia australis*. 1: Appearance of ascomata on host surface. 2: Asci and ascospores (arrow = full length germ slit). 3: Ascospores. Figs. 4–5. *Cosmospora vilior*. 4: *Cosmospora vilior* on ascomatal necks of *Cannonia australis*. 5: Asci. Figs. 6–14. *Melanochaeta hemipsila*. 6: Hairy ascoma. 7: Conidiophores of *Sporoschisma saccardoi*. 8: Capitate setae. 9: Immature asci. 10: Conidiophore with conidia. 11: Chain of conidia. 12: Conidia. 13–14: Ascospores.

Scale bars: Fig. 1, 4 = 0,5 mm; Fig. 2, 11, 13–14 = 10 µm; Fig. 3, 9–10 = 5 µm ; Fig. 5 = 15 µm; Fig. 6 = 0.25 mm; Fig. 7 = 0.20 mm; Fig. 8 = 40 µm; Fig. 12 = 20 µm.


1
0,5 mm
4
0,5 mm
5
15 µm
2
10 µm
6
0,25 mm
3
5 µm
7
0,20 mm
8
40 µm
9
5 µm
10
5 µm
11
10 µm
12
20 µm
13
10 µm
14
10 µm

irregularly muriform, brown or olive green becoming distinctly paler towards the base, smooth, slightly narrower at the septa, 18–24 × 22–35 µm, with one hyaline conidiogenous cell sometimes present at the base, 10–13 µm diam.

Substratum — Spathe of *Syagrus romanzoffiana* and petiole of *Butia yatay*.

Material examined — **ARGENTINA**. **Misiones, Dpto Iguazú**: Iguazú National Park. Col. Capdet, M. & Romero, A.I. 07.V.2008 (BAFC 51678); **Entre Ríos, Dpto Colón**: El Palmar National Park. Col. Capdet, M. & Romero, A.I. 03.II.2009 (BAFC 51679).

Geographic distribution — Finland (Moore 1959).

Remarks — The measurements for this species are close to those given by Moore (1959): 18–24 × 22–35 µm vs 18.5–26 × 26.5–34 µm. *Berkleasmium corticola* was first described by Karsten on birch from Finland, in a cold climate very different from subtropical Misiones.

Berkleasmium sinense Joanne E. Taylor, K.D. Hyde & E.B.G. Jones, Fungal Diversity Res. Ser. 12: 302 (2003). Pl. 2 Fig. 25–28

Teleomorph — Unknown.

Anamorph — Sporodochia punctiform, black, shining, scattered and discrete, 0.3 mm diam. Mycelium immersed in the substratum, composed of pale brown, branched hyhae. Conidiophores simple, semimacronematous. Conidiogenous cells hyaline, terminal, cylindrical, integrated, 2.5–3 µm diam. Conidia solitary, oval to ellipsoidal, irregularly muriform, brown or olive green becoming distinctly paler towards the base, smooth, slighty narrower at the septa, 42–52.5 × 18–28.5 µm, with 1–3 hyaline subtending cells at the base 9–12 µm diam.

Substratum — Rachis of *Euterpe edulis*.

Material examined — **ARGENTINA**. **Misiones, Dpto Iguazú**: Iguazú National Park. Col. Capdet, M. & Romero, A.I. 16.X.2008 (BAFC 51680).

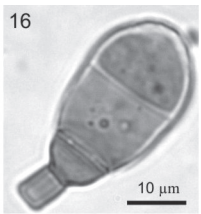
Geographic distribution — China (Taylor & Hyde 2003).

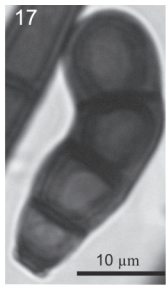
Remarks — The genus *Berkleasmium* Zobel, comprises approximately 34 species. Several have hyaline subtending cells. Measurements in the original description of *B. sinense* (Taylor & Hyde 2003) are similar to those in our material, but the subtending cells are smaller in our material. The Chinese specimen was recorded on *Trachycarpus fortunei* in a tropical climate.

Plate 2 Figs. 15–20. *Brachysporiella gayana*. 15: Conidiophore with conidia. 16–20: Conidia. Figs. 21–24. *Berkleasmium corticola*. 23: General aspect. 21–24: Conidia with rest of conidiogenous cells. Figs. 25–28. *Berkleasmium sinense*. Conidia (arrow = subtending cells).

Scale bars: Fig. 15, 25 = 40 µm; Fig. 16–22, 26–28 = 10 µm; Fig. 23 = 0.1 mm; Fig. 24 = 20.

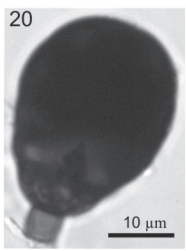
15
40 µm

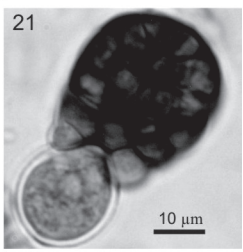

16
10 µm

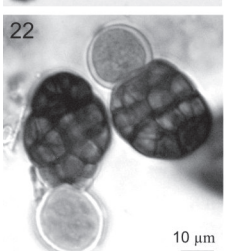

17
10 µm

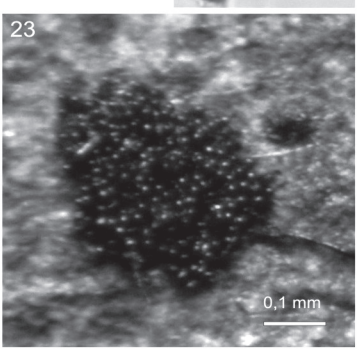
18
10 µm

19
10 µm

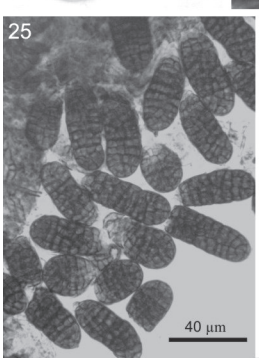

20
10 µm

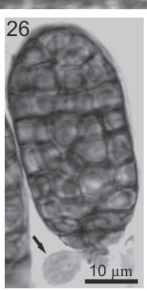

21
10 µm

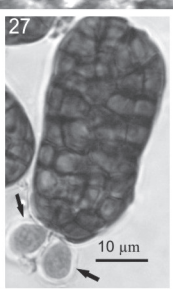

22
10 µm

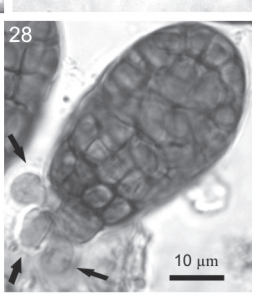

23
0,1 mm

24
20 µm


25
40 µm


26
10 µm


27
10 µm


28
10 µm

Dictyosporium cocophylum Bat., Bol. Secr. Agric., Pernambuco 18: 5 (1951). Pl. 3 Fig. 29–31

Teleomorph — Unknown.

Anamorph — Colonies composed of sporodochia, black, opaque. Conidia 42–54 × 20–24 µm, cheiroid, not complanate, consisting mostly of 7 arms of cells forming, brown or olive-brown, cylinders, arms 7 µm wide, number of cells usually average 46 per conidia, appendages absent.

Substratum — Floral rachis of *Butia yatay*.

Material examined — **ARGENTINA**. **Entre Ríos, Dpto Colón**: El Palmar National Park. Col. Capdet, M. & Romero, A.I. 15.IV.2009 (BAFC 51681).

Geographic distribution — Brazil (Goh et al. 1999).

Remarks — Compared with the description by Goh et al. (1999), conidia in the Argentine material are smaller: 42–54 × 20–24 µm vs 53–76 × 19–22 µm. This may be because the conidia were not yet fully formed. This species was described from leaves of *Cocos nucifera* L. in association with lesions (Goh et al. 1999).

In Argentina, Spegazzini (1908) described *Dictyosporium yerbae* Speg. and Arambarri et al. (1987, 2001) reported two other species: *D. elegans* Corda and *D. triramosum* Aramb. et al.

Dictyosporium zeylanicum Petch, Ann. R. bot. Gdns Peradeniya 6(3): 252 (1917). Pl. 3 Fig. 32–34

Teleomorph — Unknown.

Anamorph — Colonies sporodochia, black, opaque. Mycelium branched, brown. Conodiophores micronematous. Conidiogenous cells difficult to observe. Conidia cheiroid, complanate, consisting mostly of 5 arms of cells, the central arm dark brown, the next 2 arms lighter brown and the outer arms even lighter, often narrower at the septa, 28–34 × 20–23 µm, arms 5 µm wide, number of cells usually average 28, cells which are narrower at septa appearing more or less square, appendages absent.

Substratum — Peduncle of *Euterpe edulis*.

Material examined — **ARGENTINA**. **Misiones, Dpto Iguazú**: Iguazú National Park. Col. Capdet, M. & Romero, A.I. 17.X.2008 (BAFC 51682).

Geographic distribution — Brazil (Grandi & Silva 2006); Sri Lanka (Goh et al. 1999).

Remarks — The present specimen agrees with the description by Goh et al. (1999), the only difference being the conidial size, which is slightly smaller in the Argentine material: 26–40 × 13–25 µm vs 28–34 × 20–23 µm.

Sporidesmium macrurum (Sacc.) M.B. Ellis, Mycol. Pap. 70: 53 (1958).
Pl. 3 Fig. 35–36

Teleomorph — Unknown.

Anamorph — Colonies effuse, black, hairy. Mycelium partly superficial on the substratum branched, septate, hyaline to brown. Conidiophores macronematous, mononematous, up to 150 µm long, 4–5 µm wide, simple, septate, brown, swollen at the apex. Conidia straight or curved, rostrate, obclavate, 3- to 4-septate, smooth, becoming gradually paler towards the apex, basal cell dark brown and adjacent cell olive brown, 35–50 × 8–10 µm, 1–2 µm near the apex, 3–4 µm wide at the base.

Substratum — Sheath of *Syagrus romanzoffiana*.

Material examined — **ARGENTINA**. **Misiones, Dpto Iguazú**: Iguazú National Park. Col. Capdet, M. & Romero, A.I. 07.V.2008 (BAFC 51683).

Geographic distribution — Ghana, Indonesia, Malaysia (Ellis 1958); Papua-New Guinea (Matsushima 1971); Cuba (Holubová-Jechová & Mercado Sierra 1984); Puerto Rico (Cybertruffle's Robigalia 2009).

Remarks — *Sporidesmium macrurum* is very common on palms. The conidia of the present collection have smooth walls and are smaller (35–50 × 8–10 µm vs 40–55 × 9–11) than those described by Ellis (1958).

Endocalyx melanoxanthus (Berk. & Broome) Petch., Ann. Bot. Lond. 22: 390. (1908) var. ***melanoxanthus*** Pl. 3 Fig. 37–38

Teleomorph — Unknown.

Anamorph — Conidiomata scattered, cupulate or cylindrical, brightly yellow or greenish yellow, 0.35 × 0.6 mm, peridial hyphae enclosing the inner black conidial mass. Conidiogenous cells holoblastic, cylindrical, integrated or terminal. Conidia solitary, 12–17 × 10–12 µm, reniforme, round or oval, dark brown, rugose, with a hyaline germ slit.

Substratum — Sheath, petiole, rachis and peduncle of *Syagrus romanzoffiana*. Petiole of *Euterpe edulis* and *Butia yatay*.

Material examined — **ARGENTINA**. **Misiones, Dpto Iguazú**: Iguazú National Park. Col. Capdet, M. & Romero, A.I. 17.VI.2009 (BAFC 51684); 20.VIII.2008 (BAFC 51685); 24.IV.2008 (BAFC 51686); **Entre Ríos, Dpto Colón**: El Palmar National Park. Col Capdet, M. & Romero, A.I. 20.VIII.2008 (BAFC 51685).

Geographic distribution — Ghana (Hughes 1952); Sri Lanka, Jamaica, Malaysia, Papua-New Guinea, Pakistan, Philippines, Sierra Leone, USA (Ellis 1971); Taiwan (Matsushima 1980); Japan (Okada & Tubaki 1984); Cuba (Holubová-Jechová & Mercado Sierra 1984); Peru (Matsushima 1993); Mexico (Heredia et al. 2000); Puerto Rico (Cybertruffle's Robigalia 2009).

Remarks — The examined material fits the description of Holubová-Jechová and Mercado Sierra (1984). *Endocalyx melanoxanthus* is very common in different palms, but its pathogenicity is uncertain. This anamorph was collected in all seasons and with high frequency.

Ernakulamia cochinensis (Subram.) Subram., Kavaka 22/23: 67 (1996, "1994/1995") Pl. 3 Fig. 39

Teleomorph — Unknown.

Anamorph — Colonies effuse, dark brown or black. Mycelium superficial. Conidia solitary, muriform, variable in shape, obconical or piriform, dark brown or black, often verrucose, 43–97 × 31–65 µm, with up to 12-septate appendages, pale brown, up to 90 µm long, 3–4 µm wide.

Substratum — Spathe of *Syagrus romanzoffiana*.

Material examined — **ARGENTINA**. **Misiones, Dpto Iguazú**: Iguazú National Park. Col. Capdet, M. & Romero, A.I. 07.V.2008 (BAFC 51687).

Geographic distribution — India (Ellis 1976); Japan, Mexico (Heredia Abarca et al. 1997); Cuba (Holubová-Jechová & Mercado Sierra 1986; Mercado Sierra et al. 1997, 2005); Malaysia (Cybertruffle's Robigalia 2009).

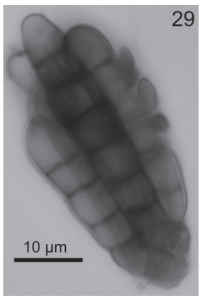
Remarks — Subramanian (1996) proposed the genus *Ernakulamia* for *Petrakia cochinensis* Subram., because he considered it as distinct from the type species *Petrakia echinata* (Peglion) Syd. & P. Syd. and *Piricauda* Bubák to which Ellis (1976) had transferred the taxon as *Piricauda cochinensis* (Subram.) M.B. Ellis. Most authors (Heredia Abarca et al. 1997, Taylor & Hyde 2003, Mercado Sierra et al. 1997, 2005) follow Ellis (1976) and retain the species in *Piricauda* without taking into account Subramanian (1996).
The above description of this species agrees with descriptions by Ellis (1976), Heredia Abarca et al. (1997), and Mercado Sierra et al. (1997, 2005); the conidial size range in the Argentine collection includes the size range given by Heredia Abarca et al. (1997): 43–97 × 31–65 µm vs 60–73 × 55–65 µm.

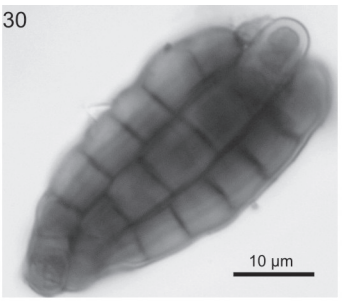
Musicillium theobromae (Turconi) Zare & W. Gams, Nova Hedwigia 85(3–4): 482 (2007). Pl. 3 Fig. 40–41

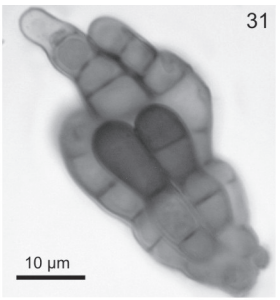
Teleomorph — Unknown.

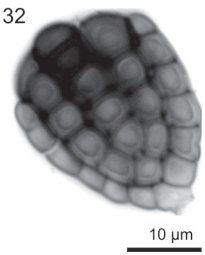
Plate 3 Figs. 29–31. *Dictyosporium cocophylum*. Conidia. Figs. 32–34. *Dictyosporium zeylanicum*. Conidia. Figs. 35–36. *Sporidesmium macrurum*. Conidia. Figs. 37–38. *Endocalyx melanoxanthus* var. *melanoxanthus*. 37: General aspect of ascomata. 38: Conidia (arrow= full length germ slit). Fig. 39. *Ernakulamia cochinensis*. Conidia. Figs. 40–41. *Musicillium theobromae*. 40: Aspect general. 41: Conidiogenous cells. Figs. 42–43. *Stachylidium bicolor*. 42: Conidiophore. 43: Conidiophore with echinulate conidiogenous cells.

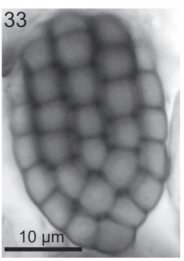
Scale bars: Fig. 29–33, 36, 38 = 10 µm; Fig. 34 = 40 µm ; Fig. 36, 43 = 5 µm; Fig. 37 = 0.25 mm; Fig. 39 = 60 µm; Fig. 40 = 100 µm; Fig. 41 = 30 µm; Fig. 42 = 80 µm.

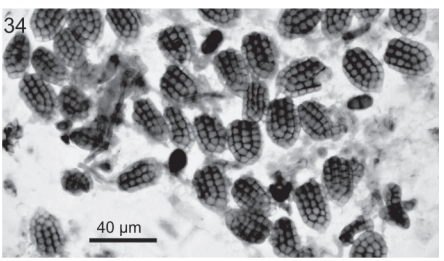

29
10 µm


30
10 µm

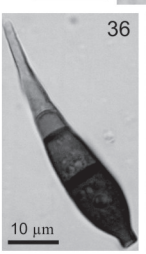

31
10 µm

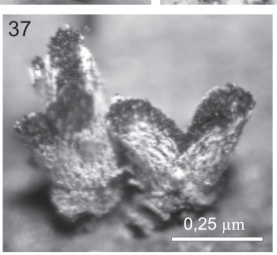

32
10 µm

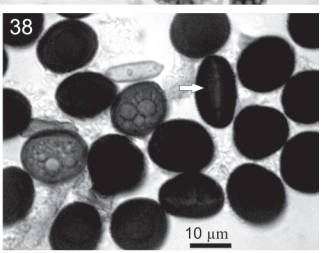

33
10 µm

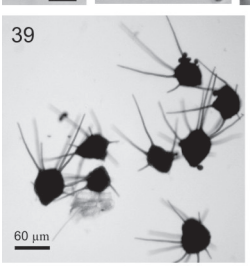

34
40 µm

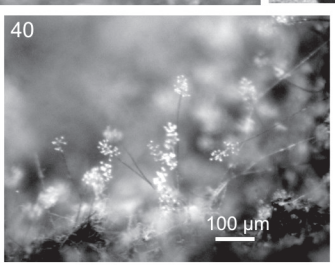
35
5µm

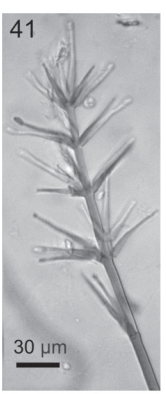

36
10 µm

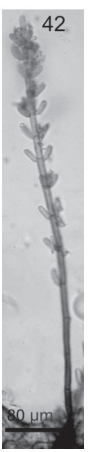

37
0,25 µm

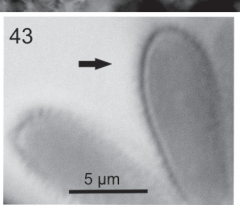

38
10 µm


39
60 µm


40
100 µm


41
30 µm


42
80 µm


43
5 µm

Anamorph — Colonies scattered, pilose, black or brown. Mycelium composed of immersed, smooth, branched hyphae, septate, hyaline or brown, 2.5–3.5 µm wide. Conidiophores straight, enclosed, dark brown at the base to light brown at the apex, up to 360 µm long, 4.5–7.5 µm wide. Conidiogenous cells in whorls of 3–6, hyaline, scarcely tapering towards the tip, 15–65 µm long, 2–5 µm wide at the base. Conidia cylindrical or spherical, hyaline 3–7 × 2–3 µm.

Substratum — Floral rachis of *Euterpe edulis*.

Material examined — **ARGENTINA. Misiones, Dpto Iguazú**: Iguazú National Park. Col. Capdet, M. & Romero, A.I. 16.X.2008 (BAFC 51688).

Geographic distribution — Spain, Colombia, Portugal, Jamaica, Zimbabwe (Hughes 1951); Taiwan (Matsushima 1980); Georgia (Holubová-Jechová 1980), Cuba (Mercado Sierra et al. 1997); Brazil, Egypt, India, Iran, Nigeria (Zare et al. 2007); Australia, Nicaragua, Oman, Puerto Rico, Trinidad & Tobago, Venezuela (Cybertruffle's Robigalia 2009).

Remarks — *Musicillium theobromae* is perhaps best known as *Verticillium theobromae* (Hawksworth & Holliday 1970a), but Zare et al. (2007) recently established a new genus, *Musicillium*, based mainly on molecular characters. This species is a causal agent of "cigar-end rot" of banana. Morphologically similar to *V. albo-atrum* Reinke & Berthold, which also produces have dark conidiophores, *Musicillium theobromae* differs in its smaller conidia (3–7 × 2–3 µm vs 3.5–10.5 (–12.5) × 2–4 µm) and torulose mycelium (Hawksworth & Holliday 1970b).

Stachylidium bicolor Link, Mag. Gesell. Naturf. Freunde, Berlin 3: 15 (1809).

Pl. 3 Fig. 42–43

Teleomorph — Unknown.

Anamorph — Colonies scattered, olivaceous brown. Mycelium immersed in the substratum. Conidiophores solitary or clustered, up to 600 µm long, 3–5 µm wide, unbranched, septate, brown and light brown towards the apex, echinulate from the middle towards the apex, with whorls of 2–6 conidiogenous cells from the mid point upwards. Conidiogenous cells oval to oval-cylindrical, pale brown, echinulate, 9–14 × 4–5 µm. Conidia cylindrical to ellipsoidal, smooth, pale brown, oval, 4–6 × 2–2.5 µm.

Substratum — Floral rachis of *Euterpe edulis*.

Material examined — **ARGENTINA. Misiones, Dpto Iguazú**: Iguazú National Park. Col. Capdet, M. & Romero, A.I. 16.X.2008 (BAFC 51724).

Geographic distribution — Ghana (Hughes 1952); Japan (Matsushima 1975); Uganda (Matsushima 1980); Georgia (Holubová-Jechová 1980); Mexico (Heredia Abarca et al. 1997); Cuba, Malaysia, New Zealand, Papua-New Guinea, Sierra Leone, Solomon Islands, Taiwan, Venezuela, Zimbabwe (Cybertruffle's Robigalia 2009).

Remarks — The description matches that by Matsushima (1975, 1980) except for conidial sizes which are, however, within the range he provided.

Acknowledgments

This study was supported by Consejo Nacional de Investigaciones Científicas y Técnicas (Conicet) (PRHIDEB Publication Nº 178) and by the UK Darwin Initiative. We thank Justo Herrera from Iguazú National Park (Misiones) and Aristóbulo Maranta from El Palmar National Park (Entre Ríos) and their teams.

Literature cited

APN (Administración de Parques Nacionales). 2008. Parque Nacional El Palmar. http://www.parquesnacionales.gov.ar/03_ap/11_palmar_PN/11_palmar_PN.htm

Arambarri AM, Cabello MN, Mengascini A. 1987. Estudio sistemático de los Hyphomycetes del Río Santiago. (Prov. de Buenos Aires, Argentina). Darwiniana. 28(1–4): 293–301.

Arambarri AM, Cabello MN. 1990. Estudio sistemático de los Hyphomycetes del Río Santiago. IV. (Buenos Aires, Argentina). Boletín de la Sociedad Argentina de Botánica. 26(3–4): 143–148.

Arambarri AM, Cabello MN, Cazau MC. 2001. *Dictyosporium triramosum*, a new hyphomycete from Argentina. Mycotaxon 78: 185–189.

Blombery A, Rodd T. 1982. An informative, practical guide to palms of the world: their cultivation, and landscape use. Angus & Robertson Book (Australia). 199 pp.

Cabral EL, Castro M. 2007. Palmeras Argentinas, guía para el reconocimiento. Literature of Latin America: Buenos Aires (República Argentina). 88 pp.

Cabrera AL, Willink A. 1980. Biogeografía de América Latina. 2 º ed. O.E.A., Washington, D.C. 130 pp.

Carmona MA, Zapata HL, Whright ER. 1990. Mancha foliar del pindó (*Arecastrum romanzoffianum*) ocasionada por *Pestalotiopsis palmarum*. Rev. Facultad de Agronomía 11(2–3): 101–105.

Catania M del V, Romero AI. 2007. Contribution to the study of Ascomycetes on *Podocarpus parlatorei* Pilg. In Tucumán and Catamarca provinces (Argentina). Asociación de Biología de Tucumán. Biocell 31(2): 263.

Chebez JC. 1994. Los que se van. Especies Argentinas en peligro. Editorial Albatros: Buenos Aires (República Argentina). 604 pp.

Cúndom MA, Cabrera MG, Cejas P. 2006. Manejo Integrado de Plagas y Agroecología (Costa Rica) 77: 82–85.

Cybertruffle's Robigalia. 2009. Observations of fungi and their associated organisms. [www.cybertruffle.org.uk/robigalia/eng, website accessed.

Dirección de Bosques. Secretaría de Ambiente y Desarrollo Sustentable. 2003. Atlas de los Bosques Nativos Argentinos. Secretaría de Ambiente y Desarrollo Sustentable: Buenos Aires (Argentina). 243 pp.

Ellis MB. 1958. *Clasterosporium* and some allied *Dematiaceae-Phragmosporae* I. Mycological Papers 70: 1–89.

Ellis MB. 1959. *Clasterosporium* and some allied *Dematiaceae-Phragmosporae* II. Mycological Papers 72: 1–75.

Ellis MB. 1971. Dematiaceous hyphomycetes. Commonwealth Agricultural Bureaux: Farnham Royal, Slough (England). 608 pp.

Ellis MB. 1976. More dematiaceous hyphomycetes. Commonwealth Agricultural Bureaux: Farnham Royal, Slough (England). 507 pp.

Fröhlich J, Hyde KD. 2000. Palm microfungi. Fungal Diversity Press. Hong Kong (China). 247 pp.

Galindo-Leal C, Gusmão Câmara I. (eds.). 2003. The Atlantic Forest of South America: biodiversity status, threats and outlook. Publisher: Washington (EEUU) Island Press. 488 pp.

Goh TK, Ho WH, Hyde KD, Umali TE. 1997. New record and species of *Sporoschisma* and *Sporoschismopsis* from submerged wood in the tropics. Mycological Research 101: 1295–1307.

Goh TK, Hyde KD, Ho WH, Yanna. 1999. A revision of the *Dictyosporium*, with descriptions of three new species. Fungal Diversity 2: 65–100.

Grandi RAP, Silva TV. 2006. Fungos anamorfos decompositores do folhedo de *Caesalpinia echinata* Lam. Revista Brasileira de Botânica. 29(2): 257–287.

Guu JR, Ju YM, Hsieh HJ. 2007. Nectriaceous fungi collected from forests in Taiwan. Botanical Studies 48: 187–203.

Hawksworth DL, Holliday P. 1970a. *Verticillium theobromae*. CMI Descriptions of pathogenic fungi and bacteria N°259. CMI, Kew, Surrey, England.

Hawksworth DL, Holliday P. 1970b. *Verticillium albo-atrum*. CMI Descriptions of pathogenic fungi and bacteria. N°255. CMI, Kew, Surrey, England.

Heredia Abarca G, Mena Portales J, Mercado Sierra A, Reyes Estebanez M. 1997. Tropical Hyphomycetes of Mexico. II. Some species from the tropical biological station "Los Tuxtlas", Veracruz, Mexico. Mycotaxon 64: 203–233.

Heredia G, Arias RM, Reyes M. 2000. Contribución al conocimiento de los hongos hyphomycetes de México. Acta Botánica Mexicana 51: 39–51.

Heredia Abarca G, Reyes Estebanez M, Arias Mota RM. 2004. Adiciones al conocimiento de la diversidad de los hongos conidiales del bosque mesófilo de la montaña del Estado de Veracruz. Acta Botánica Mexicana 66: 1–22.

Holmgren PK, Holmgren NH, Barnett LC. 1990. Index Herbariorum. Part I: The Herbaria of the world. New York Botanical Garden: New York (U.S.A.). 693 pp.

Holubová-Jechová V. 1980. Lignicolous and some other saprophytic hyphomycetes from the USSR. I. Eesti NSV Tead.Akad. Toim., Biol., 29: 131–147.

Holubová-Jechová V, Mercado Sierra A. 1984. Studies on Hyphomycetes from Cuba II. Hyphomycetes from the Isla de la Juventud. Česká Mykologie 38(2): 96–120.

Holubová-Jechová V, Mercado Sierra A. 1986. Dematiaceous hyphomycetes from the Province Pinar del Rio. Česká Mykologie 40: 142–164.

Hyde KD, Cannon, PF. 1999. Fungi causing tar spots on palms. Mycologial Papers, N° 175: 1–114.

Hyde KD, Fröhlich J. 1997. Fungi from palms. XXXVII. The genus *Astropharіella*, including ten new species. Sydowia 50(1): 81–132.

Hyde KD, Fröhlich J, Taylor JE. 1998. Fungi from palms. XXXVI. Reflections on unitunicate ascomycetes with apiospores. Sydowia 50(1): 21–80.

Hyde KD, Taylor JE, Fröhlich J. 2000. Genera of *Ascomycetes* from palms. Fungal Diversity Press. Hong Kong (China). 247 pp.

Hughes SJ. 1949. Studies on micro-fungi. II. The genus *Sporochisma* Berkeley & Broome and a re-description of *Helminthosporium rousselianum* Montagne. Mycological Papers 31: 1–33.

Hughes SJ.1951. Studies on Micro-fungi. XI. Some hyphomycetes which produce phialides. Mycological Papers 45: 1–36.

Hughes SJ.1952. Fungi from the Gold Coast. I.. Mycological Papers 48: 1–91.

Kirk PM, Cannon PF, Minter DW, Stalpers JA. 2008. Dictionary of the Fungi 10th Edition, CAB International, Oxon, UK. 771 pp.

Nag Raj TR, Kendrick B. 1975. A monograph of *Chalara* and allied genera. Wilfrid Laurier University Press. Ontario (Canada). 200 pp.

Nong Y, Zhuang W-Y. 2005. Preliminary Survey of *Bionectriaceae* and *Nectriaceae* (*Hypocreales, Ascomycetes*) from Jigongshan, China. Fungal Diversity 19: 95–107.

Matsushima T. 1971. Microfungi of the Salomon Islands and Papua-New Guinea. Published by the author, Kobe (Japan). 78 pp.

Matsushima T. 1975. Icones microfungia Matsushima Lectorum. Published by the author, Kobe (Japan). 209 pp.

Matsushima T. 1980. Saprophytic microfungi from Taiwan. Hyphomycetes. Matsushima Mycological Memoirs 1. Published by the author. Kobe (Japan). 82 pp.

Matsushima T. 1993. Matsushima Mycological Memoirs 8. Published by the author. Kobe (Japan). 75 pp.

Mercado Sierra A, Holubová-Jechová V, Mena Portales J. 1997. Hifomicetes dematiáceos de Cuba enteroblásticos. Monographie XXIII. Museo Regionale Di Scienza Naturali, Torino. 388 pp.

Mercado Sierra A. 1981. Lista preliminar de hifomicetes dematiáceos de la Estación Ecológica de Sierra del Rosario y zonas adyacentes. Acta Bot. Cubana, La Habana, 6: 1–6.

Mercado Sierra A, Guarro J, Heredia G. 2005. The hyphomycete genus *Piricauda*, with description of a new species. Mycological Research 109(6): 723–728.

Moore RT. 1959. The genus *Berkleasmium*. Mycologia 51(5): 734–739.

Müller E, Harr J, Sulmont P. 1969. Deux Ascomycetes dont le stand conidien presente des conidias phaeophragmiées (endogénes). Revue de Mycologic 33: 369–378.

Okada G, Tubaki K. 1984. A new species and a new variety of *Endocalyx* (*Deuteromycotina*) from Japan. Mycologia, 76(2): 300–313.

Rossman AY, Samuels GJ, Rogerson CT, Lowen R. 1999. Genera of *Bionectriaceae*, *Hypocreaceae* and *Nectriaceae* (*Hypocreales*, *Ascomycetes*). Studies in Mycology 42: 1–248.

Samuels GJ, Doi Y, Rogerson CT. 1990. *Hypocreales*. Memoirs of the New York Botanical Garden 59: 6–108.

Sivichai S, Hywel-Jones NL, Somrithipol S. 2000. Lignicolous freshwater *Ascomycota* from Thailand: *Melanochaeta* and *Soporoschisma* anamorph. Mycological Reserch 104(4): 478–485.

Spegazzini C. 1881. Fungi Argentini: Additis Nonnullis Brasiliensibus Montevideensibusque. Pugillus IV. Anales de la Sociedad Científica Argentina. 12(3): 97–117.

Spegazzini C. 1908. Hongos de la Yerba Mate. Anales del Museo Nacional de Buenos Aires 17: 138–139.

Subramanian CV. 1996 ("1994/1995"). Hyphomycetes from South East Asia–Novelties from Singapore and Malaysia. Kavaka 22/23: 52–76.

Taylor JE, Hyde KD. 1999. *Cannonia* gen.nov., from palms in the southern hemisphere. Mycological Research 103(11): 1398–1402.

Taylor JE, Hyde KD. 2003. Microfungi of tropical and temperate palms. Fungal Diversity Press. Hong Kong (China). 459 pp.

Zare R, Gams W, Starink-Willemse M, Summerbell RC. 2007. *Gibellulopsis*, a suitable genus for *Verticillium nigrescens*, and *Musicillium*, a new genus for *V. theobromae*. Nova Hedwigia 85 (3–4): 463–489.